IN THE CLAIMS

Please cancel Claims 10, 17-21, and 36 without prejudice or disclaimer.

Claim 1 (original): An output stage circuit configured for use with an operational amplifier circuit, said output stage circuit comprising:

a pair of output transistors configured to provide an output voltage; and

a controlled resistive circuit comprising at least one controlled resistive element coupled to at least one of said pair of output transistors, said at least one controlled resistive element configured to modify a dynamic impedance of said at least one of said pair of output transistors to facilitate output swing of said output stage circuit with minimal gain loss.

Claim 2 (original): The output stage circuit according to claim 1, wherein said output stage comprises a pull-down resistor coupled between said output voltage and a negative supply, said pair of output transistors comprising an upper output transistor and a lower output transistor, said at least one controlled resistive element coupled between said lower output transistor and ground, said at least one controlled resistive element configured to modify said dynamic impedance of said lower output transistor during pull-down operation.

Claim 3 (original): The output stage circuit according to claim 2, wherein said at least one controlled resistive element comprises a transistor having an output terminal coupled to an input terminal of said lower output transistor.

Claim 4 (original): The output stage circuit according to claim 1, wherein said output stage comprises a pull-up resistor coupled between said output voltage and a positive supply, said pair of output transistors comprising an upper output transistor and a lower output transistor, said at least one controlled resistive element coupled between said upper output transistor and a supply voltage, said at least one controlled resistive

element configured to modify said dynamic impedance of said upper output transistor during pull-up operation.

Claim 5 (original): The output stage circuit according to claim 4, wherein said at least one controlled resistive element comprises a transistor having an output terminal coupled to an input terminal of said upper output transistor.

Claim 6 (original): The output stage circuit according to claim 1, wherein said output stage circuit comprises:

an upper output transistor and a lower output transistor;

at least one of a pull-up resistor coupled between said output voltage and a positive supply, and a pull-down resistor coupled between said output voltage and a negative supply;

a first controlled resistive element coupled between said lower output transistor and ground, said first controlled resistive element configured to modify said dynamic impedance of said lower output transistor during pull-down operation; and

a second controlled resistive element coupled between said upper output transistor and a supply voltage, said second controlled resistive element configured to modify said dynamic impedance of said upper output transistor during pull-up operation.

Claim 7 (original): The output stage circuit according to claim 1, wherein said controlled resistive circuit further comprises at least one output sense element configured to sense said output voltage and provide level shifting to an appropriate voltage for operation of said at least one controlled resistive element.

Claim 8 (original): The output stage circuit according to claim 7, wherein said output sense element comprises a current source coupled to a supply voltage, and a diode-connected transistor coupled between said current source and said output voltage.

Claim 9 (original): The output stage circuit according to claim 1, wherein said output stage circuit further comprises one of a pull-down resistor coupled between said

output voltage and a negative supply voltage and a pull-up resistor coupled between said output voltage and a positive supply voltage.

Claim 10 (cancelled).

Claim 11 (currently amended): An operational amplifier circuit for high-speed applications, said operational amplifier circuit comprising:

an input stage circuit configured for receiving an input signal and providing an output signal;

an output stage circuit comprising:

a pair of output transistors configured to provide an output voltage; and

a controlled resistive circuit comprising at least one controlled resistive element coupled to at least one of said pair of output transistors, said at least one controlled resistive element configured to modify a dynamic impedance of said at least one of said pair of output transistors to facilitate output swing of said output stage circuit with minimal gain loss,

~~The operational amplifier circuit according to claim 10,~~ wherein said output stage circuit comprises a pull-down resistor coupled between said output voltage and a negative supply, said pair of output transistors comprising an upper output transistor and a lower output transistor, said at least one controlled resistive element comprising a transistor having an output terminal coupled to an input terminal of said lower output transistor, said at least one controlled resistive element configured to modify said dynamic impedance of said lower output transistor during pull-down operation.

Claim 12 (currently amended): An operational amplifier circuit for high-speed applications, said operational amplifier circuit comprising:

an input stage circuit configured for receiving an input signal and providing an output signal;

an output stage circuit comprising:

a pair of output transistors configured to provide an output voltage; and

a controlled resistive circuit comprising at least one controlled resistive element coupled to at least one of said pair of output transistors, said at least one controlled resistive element configured to modify a dynamic impedance of said at least one of said pair of output transistors to facilitate output swing of said output stage circuit with minimal gain loss,

~~The operational amplifier circuit according to claim 10,~~ wherein said output stage circuit comprises a pull-up resistor coupled between said output voltage and a positive supply, said pair of output transistors comprises an upper output transistor and a lower output transistor, said at least one controlled resistive element comprising a transistor having an output terminal coupled to an input terminal of said upper output transistor, said at least one controlled resistive element configured to modify said dynamic impedance of said upper output transistor during pull-up operation.

Claim 13 (currently amended): An operational amplifier circuit for high-speed applications, said operational amplifier circuit comprising:

an input stage circuit configured for receiving an input signal and providing an output signal;

an output stage circuit comprising:

a pair of output transistors configured to provide an output voltage; and

a controlled resistive circuit comprising at least one controlled resistive element coupled to at least one of said pair of output transistors, said at least one controlled resistive element configured to modify a dynamic impedance of said at least one of said pair of output transistors to facilitate output swing of said output stage circuit with minimal gain loss,

~~The operational amplifier circuit according to claim 10,~~ wherein said output stage circuit comprises:

an upper output transistor and a lower output transistor;

at least one of a pull-up resistor coupled between said output voltage and a positive supply, and a pull-down resistor coupled between said output voltage and a negative supply;

a first controlled resistive element coupled between said lower output transistor and ground, said first controlled resistive element configured to modify said dynamic impedance of said lower output transistor during pull-down operation; and

a second controlled resistive element coupled between said upper output transistor and a supply voltage, said second controlled resistive element configured to modify said dynamic impedance of said upper output transistor during pull-up operation.

Claim 14 (currently amended): An operational amplifier circuit for high-speed applications, said operational amplifier circuit comprising:

an input stage circuit configured for receiving an input signal and providing an output signal;

an output stage circuit comprising:

a pair of output transistors configured to provide an output voltage; and

a controlled resistive circuit comprising at least one controlled resistive element coupled to at least one of said pair of output transistors, said at least one controlled resistive element configured to modify a dynamic impedance of said at least one of said pair of output transistors to facilitate output swing of said output stage circuit with minimal gain loss,

~~The operational amplifier circuit according to claim 10,~~ wherein said controlled resistive circuit further comprises at least one output sense element configured to sense said output voltage and provide level shifting to an appropriate voltage for operation of said at least one controlled resistive element.

Claim 15 (original): The operational amplifier circuit according to claim 14, wherein said at least one output sense element comprises a current source coupled to a

supply voltage, and a diode-connected transistor coupled between said current source and said output voltage.

Claim 16 (currently amended): An operational amplifier circuit for high-speed applications, said operational amplifier circuit comprising:

an input stage circuit configured for receiving an input signal and providing an output signal;

an output stage circuit comprising:

a pair of output transistors configured to provide an output voltage; and

a controlled resistive circuit comprising at least one controlled resistive element coupled to at least one of said pair of output transistors, said at least one controlled resistive element configured to modify a dynamic impedance of said at least one of said pair of output transistors to facilitate output swing of said output stage circuit with minimal gain loss,

~~The operational amplifier circuit according to claim 10,~~ wherein said output stage circuit further comprises one of a pull-down resistor coupled between said output voltage and a negative supply voltage and a pull-up resistor coupled between said output voltage and a positive supply voltage.

Claims 17-21 (cancelled).

Claim 22 (currently amended): A method for facilitating output swing in an output stage circuit of an amplifier, said method comprising the steps of:

sensing an output voltage provided by said output stage circuit to determine whether said output voltage is approaching one of a positive power supply and a negative power supply;

modifying a dynamic impedance effect of at least one output transistor of said output stage circuit when said output stage circuit approaches said one of an upper power supply and a lower power supply.

~~The method according to claim 17,~~ wherein said step of sensing said output voltage comprises using an output sense element to sense said output voltage and to provide level shifting to an appropriate voltage for operation of said controlled resistive element.

Claim 23 (original): The method according to claim 22, wherein said step of modifying said dynamic impedance effect comprises using said controlled resistive element comprising a transistor coupled between ground and a lower output transistor to add resistance to modify said dynamic impedance effect of said lower output transistor during pull-down operation.

Claim 24 (original): The method according to claim 23, wherein said step of modifying said dynamic impedance effect further comprises using a pull-down resistor coupled between said output voltage and a negative supply voltage to facilitate pull-down operation.

Claim 25 (original): An output stage circuit configured for use with an operational amplifier circuit, said output stage circuit comprising:

a pair of output transistors configured to provide an output voltage, said pair of output transistors comprising an upper output transistor and a lower output transistor;

at least one of a pull-up resistor coupled between said output voltage and a positive supply, and a pull-down resistor coupled between said output voltage and a negative supply;

a controlled resistive circuit comprising:

at least one controlled resistive element coupled to at least one of said upper output transistor and said lower output transistor, said at least one controlled resistive element configured to enhance gain of said output stage circuit during at least one of a pull-up operation and a pull-down operation; and

at least one output sense element configured to sense said output voltage and provide a control voltage for operation of said at least one controlled resistive element.

Claim 26 (original): The output stage circuit according to claim 25, wherein said at least one controlled resistive element is configured to modify a dynamic impedance of said at least one of said upper output transistor and said lower output transistor during at least one of a pull-up operation and a pull-down operation of said output stage circuit.

Claim 27 (original): The output stage circuit according to claim 25, wherein said output stage comprises a pull-down resistor coupled between said output voltage and said negative supply, said at least one controlled resistive element coupled between said lower output transistor and ground and configured to modify said dynamic impedance of said lower output transistor during pull-down operation, said at least one controlled resistive element comprises a transistor having an output terminal coupled to an input terminal of said lower output transistor.

Claim 28 (original): The output stage circuit according to claim 25, wherein said output stage comprises a pull-up resistor coupled between said output voltage and a positive supply, said at least one controlled resistive element coupled between said upper output transistor and a supply voltage and configured to modify said dynamic impedance of said upper output transistor during pull-up operation, said at least one controlled resistive element comprises a transistor having an output terminal coupled to an input terminal of said upper output transistor.

Claim 29 (original): The output stage circuit according to claim 25, wherein said output stage circuit comprises:

both said pull-up resistor configured for pull-up operation and said pull-down resistor configured for pull-down operation, said pull-up resistor and said pull-down resistor being coupled through switches to said output voltage;

a first controlled resistive element coupled between said lower output transistor and ground, said first controlled resistive element configured to enhance gain of said output stage circuit during pull-down operation;

a first output sense element configured to sense said output voltage and provide a control voltage for operation of said first controlled resistive element;

a second controlled resistive element coupled between said upper output transistor and a supply voltage, said second controlled resistive element configured to enhance gain of said output stage circuit during pull-up operation; and

a second output sense element configured to sense said output voltage and provide a control voltage for operation of said second controlled resistive element.

Claim 30 (original): The output stage circuit according to claim 25, wherein said at least one output sense element comprises a current source coupled to a supply voltage, and a diode-connected transistor coupled between said current source and said output voltage, said current source and a gate-drain connection of said at least one output sense element being coupled to a control terminal of said at least one controlled resistive element.

Claim 31 (original): An output stage circuit configured for use with an operational amplifier circuit, said output stage circuit comprising:

an upper output transistor and a lower output transistor configured to provide an output voltage;

a pull-down circuit configured for pull-down operation of said output circuit, said pull-down circuit comprising:

a pull-down resistor coupled between said output voltage and a negative supply;

a controlled resistive element coupled to said lower output transistor and configured to enhance gain of said output stage circuit during pull-down operation; and

an output sense element configured to sense said output voltage and provide a control voltage for operation of said controlled resistive element.

Claim 32 (original): The output stage circuit according to claim 31, wherein said controlled resistive element is configured to modify a dynamic impedance of said lower output transistor during pull-down operation of said output stage circuit.

Claim 33 (original): The output stage circuit according to claim 31, wherein said controlled resistive element comprises a transistor having an output terminal coupled to an input terminal of said lower output transistor.

Claim 34 (original): The output stage circuit according to claim 31, wherein said output sense element comprises a current source coupled to a supply voltage, and a diode-connected transistor coupled between said current source and said output voltage, said current source and a gate-drain connection of said output sense element being coupled to a control terminal of said controlled resistive element.

Claim 35 (original): The output stage circuit according to claim 31, wherein said output stage circuit further comprises a pull-up circuit configured for pull-up operation of said output circuit, said pull-up circuit comprising:

a pull-up resistor coupled through a switch between said output voltage and a positive supply;

a second controlled resistive element coupled to said upper output transistor and configured to enhance gain of said output stage circuit during said pull-up operation; and

a second output sense element configured to sense said output voltage and provide a control voltage for operation of said second controlled resistive element.

Claim 36 (cancelled).

Claim 37 (currently amended): The method according to claim ~~36~~ 39, wherein said step of adding a resistance results in modifying of a dynamic impedance effect of said lower output transistor.

Claim 38 (currently amended): The method according to claim ~~36~~ 39, wherein said method further comprises the step of controlling said controlled resistive element to provide an approximately zero resistance during normal operation, and with increased resistance when said output voltage is being pulled downwards to said lower power supply.

Claim 39 (currently amended): A method for facilitating pull-down operation in an output stage circuit of an operational amplifier, said method comprising the steps of:

sensing with an output sense element an output voltage provided by said output stage circuit to determine whether said output voltage is being pulled downwards to a lower power supply comprising approximately ground;

adding a resistance through a controlled resistive element to a lower output transistor of said output stage circuit when said output voltage is being pulled downwards to said lower power supply; and

reducing gain loss of said output stage circuit caused by said lower output transistor,

~~The method according to claim 36,~~ wherein said step of sensing with said output sense element said output voltage further comprises providing level shifting to an appropriate voltage for operation of said controlled resistive element.

Claim 40 (currently amended): The method according to claim ~~36~~ 39, wherein said step of modifying said dynamic impedance effect further comprises using a pull-down resistor coupled between said output voltage and a negative supply voltage to facilitate pull-down operation.

Claim 41 (previously presented): An output stage circuit comprising:

a pair of output transistors; and

at least one controlled resistive element coupled to at least one of said pair of output transistors, said at least one controlled resistive element configured to modify a dynamic impedance of said at least one of said pair of output transistors.